ATTACHMENT VIII

Conceptual Approach For Landfill Closure

As discussed with representatives of U.S. EPA and Ohio EPA, U.S. Ceramic Tile will implement selected interim measures to ensure that the Facility conditions are protective of human health and the environment. These include:

- Performance of supplemental soil sampling and development of a risk assessment to assess whether current conditions in the vicinity of the landfill are protective of human health and the environment, and

- Design and implementation of a series of supplemental construction activities to improve the integrity, or confidence in the integrity, of various completed landfill systems.

Additional information regarding these activities is described below.

Area-Specific Risk Assessment

U.S. Ceramic Tile will conduct a risk assessment of the former hazardous waste management units at the Facility (including the continued presence, maintenance, and monitoring of the closed hazardous waste landfill). The risk assessment will include an evaluation of current and future conditions at the former hazardous waste management units and a determination of whether the conditions pose an unacceptable risk to human health or the environment under either scenario.

A site conceptual exposure model will be developed to characterize human and ecological exposure pathways potentially associated with the former hazardous waste management units, which may include:

(1) Site worker or trespasser ingestion, dust inhalation, and/or dermal contact with surface soil,

(2) Site worker ingestion and/or contact with subsurface soil and/or ground water,

(3) Future site worker or neighboring resident ingestion of ground water, and/or

(4) Potential effects on surrounding surface water systems (including ecological receptors) from migration of ground water or erosion of surface soil.

Additional detail regarding the exposure pathways that may be applicable to the Facility will be presented in the work plan that will be prepared for the risk assessment activities and submitted to U.S. EPA within 90 days following the effective date of the Consent Decree. A brief discussion of the pathways that will be addressed in that submittal is presented below. U.S. Ceramic Tile is aware that other exposure pathways may exist and will discuss all relevant pathways, in greater detail, in the work plan.

Surficial Soil

Evaluation of the potential surficial soil exposure pathways will involve characterization of constituent levels in surficial soil, assessment of potential exposure pathways, and risk to workers, trespassers, and ecological receptors. U.S. Ceramic Tile intends to control the potential for future exposures to surface soil by fencing the former hazardous waste management units to inhibit future trespassers, and recording a deed restriction to prevent future non-industrial use of the property. Due to the proximity of the historic waste management units to the property boundary, U.S. Ceramic Tile has initiated contact with adjacent property owners to seek agreements for implementation of permanent deed restrictions on portions of those properties, if needed.

In the event that the future characterization demonstrates that surficial soil concentrations are below acceptable risk thresholds, no additional actions will be warranted with respect to surficial soil. In the event that the future characterization indicates that surficial soil concentrations are above acceptable risk thresholds, appropriate mitigation measures (e.g., further characterization, hot spot removal, placement of a surface barrier layer, etc.) will be evaluated as part of the Facility-wide Corrective Measures Study or, if necessary, implemented as an Interim Measure as provided for in Section VIII.A of the Consent Decree.

Subsurface Soil

Evaluation of the potential subsurface soil exposure pathway will involve characterization of constituent levels in subsurface soil, assessment of potential exposure pathways, and evaluation of risk to humans and potential migration to ground water. U.S. Ceramic Tile anticipates that it will eliminate this potential

exposure pathway by implementing management controls and deed restrictions to prevent uncontrolled future excavation activities, and by assessing potential impacts to ground water.

Ground Water

U.S. Ceramic Tile will pursue a direct monitoring approach for evaluation of potential effects of site conditions on Facility ground water. The ground water pathway will be assessed through sampling and analysis of site ground water on a quarterly basis for a period of two years.

U.S. Ceramic Tile has conducted a groundwater assessment monitoring program since June 1989 for the surficial sediment and bedrock aquifers beneath the Facility. Historically, the monitoring program shows that dissolved metals concentrations have only occasionally exceeded the maximum concentration of constituents for ground water protection established under the hazardous waste regulations. However, the agencies believe that the results may be affected by filtering that is performed to mitigate the effects of high turbidity in the ground water samples. In addition, for risk assessment purposes, U.S. EPA requires that the results of total analyses (not dissolved analyses) be evaluated using risk-based screening levels (MCL or PRG) rather than RCRA ground water protection standards.

In order to more thoroughly evaluate ground water conditions, U.S. Ceramic Tile will perform a more detailed characterization of the surficial aquifer system as part of the area-specific risk assessment. This will involve the installation of up to seven (7) new ground water monitoring wells within the limits of the former hazardous waste management units and immediately adjacent to the closed landfill area, as shown in Figure 1. These wells will replace the existing surficial sediment aquifer wells for both the risk assessment and long-term monitoring programs. U.S. Ceramic Tile has contacted adjacent property owners to seek permission for installation of these wells. Prior to installation, an assessment of ground water levels in both the shallow and deep aquifers will be performed in order to assess the effects, if any, of the new production well (IW-12) on the ground water flow conditions beneath and surrounding the landfill.

U.S. Ceramic Tile will use enhanced well construction and sampling techniques in an effort to obtain ground water samples that are truly representative of the ground water flowing within the aquifer (i.e., samples that are not affected by aquifer particles that are pulled from the formation during sampling).

The wells will incorporate 10-foot long, 4-inch diameter screens to minimize flow velocities through the sand pack during sampling. In order to minimize potential effects of heaving sands during installation, the wells will be installed through hollow-stem augers with the use of a sacrificial center plug and be constructed using a pre-packed screen section to assure that there are no direct conduits through the final sand pack. The wells will then be developed to provide low turbidity samples, and be sampled utilizing low-flow sampling techniques to further minimize the potential for infiltration of sediments during future purging and sampling activities. Wells installed in the low lying area south of the landfill (an area subject to intermittent ponding) will be equipped with water-tight well caps that seal with the casing and inhibit entry of surface waters.

Following completion of the well installation activities, sampling and analysis will be performed for a period of two years (assuming no obvious exceedances are identified) to assess the effects of historic waste management activities and the existing landfill on the aquifer. Sampling will be performed in the surficial sediment aquifer wells; however, water levels will be obtained from both the surficial and bedrock aquifer wells to provide more complete information on ground water flow characteristics. Since the waste materials that are concentrated within the landfill (and potentially present in isolated deposits within surface and subsurface soil outside the area) have been present in this area for decades, U.S. Ceramic Tile believes that assessment of current conditions provides a conservative representation of both current and future ground water responses. As such, in the event that the enhanced monitoring program demonstrates that the surficial sediment aquifer is not affected above drinking water levels, ground water will be eliminated as a potential exposure pathway for both current and future exposure scenarios associated with materials that are located outside of the landfill liner systems. Due to the continued presence of waste materials within the landfill, long term ground water monitoring may continue to be required as part of the long term operation and maintenance activities for the landfill.

In the event that the enhanced monitoring program indicates that the surficial sediment aquifer contains constituents of concern above current drinking water thresholds, additional characterization (as approved by U.S. EPA) will be performed to assess possible current and future effects to underlying aquifers, and potential risks to surface and ground water receptors downgradient of the site. Results of this more detailed assessment will be used to identify if additional mitigation measures (e.g., soil removal, ground water collection

and treatment, etc.) are needed, as part of the Facility-wide Corrective Measures Study or, if necessary, implemented as an Interim Measure as provided for in Section VIII.A of the Consent Decree.

Surface Water

Potential effects on surface waters systems will be evaluated by collecting up to eight (8) samples of sediments from the discharge stream that crosses the former hazardous waste management units, as well as assessing the potential for migration of surficial soil and/or ground water from the vicinity of the former hazardous waste management units. Results from these activities will be utilized to assess whether there is a potential for unacceptable threat to human or ecological receptors through the surface water pathway.

In the event that the risk assessment demonstrates that representative surficial soil or ground water conditions do not exceed applicable thresholds, no additional actions will be warranted with respect to surficial soil or ground water from an ecological perspective. In the event that the risk assessment demonstrates that either surficial soil or ground water conditions exceed acceptable risk thresholds for the surface water pathway, appropriate mitigation measures (e.g., further characterization, hot spot removal, lining of waterways, placement of erosion protection layers, etc.) will be assessed as part of the Facility-wide Corrective Measures Study or, if necessary, implemented as an Interim Measure as provided for in Section VIII.A of the Consent Decree.

Landfill Enhancement Projects

Although it may be possible to demonstrate through risk assessment that variations between the completed closure construction and the approved closure plan will not adversely affect human health and the environment, U.S. Ceramic Tile will also address specific concerns regarding the completed landfill construction that have been identified by the agencies. In addition, U.S. Ceramic Tile will provide long term operation and maintenance of the closed landfill for a period of 30 years (unless an alternate period is approved by U.S. EPA). A site plan depicting the landfill area is presented as Figure 2.

The landfill enhancement projects include:

- Expansion of the previously agreed-upon settlement monitoring program,

- Updating the perimeter surface water drainage system improvements (installed pursuant to prior agreement) in conjunction with completion of certain other landfill enhancement projects,

- Design and construction of improvements to the leachate storage systems,

- Enhancement of the southern portion of the closed landfill, and

- Improving landfill flood resistance.

The conceptual approach for these activities is discussed below. An Interim Measures Work Plan, including detailed engineering design plans, will be submitted to U.S. EPA within ninety (90) days of the effective date of the Consent Decree.

Expanded Settlement Monitoring Program

U.S. Ceramic Tile will continue to implement the previously approved settlement monitoring program to assess whether the landfill is experiencing significant settlement as a result of either consolidation or instability of the waste mass. As discussed in the approved Settlement Monitoring Plan, U.S. Ceramic Tile will implement supplemental actions if the settlement plates exhibit significant movement (greater than 0.5 foot cumulative settlement at any point, or greater than 0.25 feet of differential movement between adjacent points) over a period of two (2) years. In order to further demonstrate the stability of the landfill, U.S. Ceramic Tile will install up to two additional settlement plates at locations designated by U.S. EPA and monitor these and the existing settlement plates periodically through the post-closure care period. Specifically, U.S. Ceramic Tile proposes to complete the quarterly assessment program agreed to by the parties (with the 2 added plates), to monitor the settlement plates on at least a quarterly basis as the landfill enhancement project are being implemented, and to then monitor the settlement plates in the same manner on an annual basis thereafter until the end of the operation and maintenance period (or sooner, subject to U.S. EPA's approval).

Updating Perimeter Drainage System Installation

U.S. Ceramic Tile recently completed supplemental fine grading activities to assure that surface water is directed into the inlets installed as part of the previously approved perimeter

surface water drainage improvements initiated in 1999 in conjunction with settlement of this matter. The system will be updated, as required, to conform to plans for enhancement of the southern portion of the landfill and placement of fill associated with the flood protection dike (as discussed below).

Leachate Storage System Improvement

U.S. Ceramic Tile will reconstruct the leachate storage system to provide an equivalent level of protection as the system contained in the originally approved closure design. Leachate will be collected in double-walled underground storage tanks, equipped with secondary containment and leak detection systems. The tanks will be designed to resist effects from potential fluctuations in site ground water levels, and surface and subsurface piping connections will be sealed to inhibit the infiltration of either ground or surface water. Ground water buoyancy resistance will be provided by strapping the tanks to the base of the concrete vault and/or backfilling above the base (around the tanks) with granular fill.

Calculations describing the buoyancy of the tanks, and the methods that will be used to protect these tanks from future damage, will be presented in a detailed engineering design report included as part of the Interim Measures Work Plan that will be provided to U.S. EPA for review and approval within 90 days following the effective date of the Consent Decree. The design submittal will also include a construction quality assurance plan describing the specific field measurements (observation, material conformance testing, pressure testing, etc.) that will be implemented to demonstrate that the completed construction conforms with the design (once approved).

Landfill Cap Enhancements

U.S. Ceramic Tile will enhance conditions at the southern end of the landfill in order to assure that the cap liner system overlaps the bottom liner system, and to provide increased confidence that the improved cap will inhibit surface water infiltration under theoretical future flooding conditions. In addition, the cap drainage piping in the area will be uncovered and evaluated to assess whether additional investigation and/or correction are warranted.

The cap enhancement activities will involve exposure of the top and bottom liner materials at the southeast corner of the landfill. The material limits will be followed in both directions around the landfill to the points where the cap liner

material extends laterally beyond the bottom liner. The area between the identified limits will then be smoothed to provide a suitable foundation for extension of the cap system. The landfill cap system will then be extended.

The multi-layer cap extension will consist, from bottom to top, of: a prepared bedding surface, a geosynthetic clay liner, a 40-mil HDPE liner, a synthetic drainage layer (at elevations above the flood protection dike crest) and a 30-inch minimum thickness vegetative support layer. The HDPE liner, and all components above the liner, will be connected to the matching components of the existing cap to create a continuous barrier over the southern end of the landfill. The cap HDPE liner will be extrusion welded to both the cap and bottom liner. The perimeter drainage piping will also be enhanced so that waters collected in the cap drainage system (above the cap HDPE liner) can drain to the ground surface outside of the landfill limits. The cap enhancement activities are illustrated in Figures 3 and 4.

Concurrent with construction of the southern landfill cap area improvements, U.S. Ceramic Tile will expose the flattened segment of piping that was encountered during recent construction, and (as part of construction) perform more detailed assessment of the piping along the entire southern edge of the landfill. In the event that this more detailed assessment indicates that the flattened piping was not an isolated occurrence, the perimeter drainage piping surrounding the entire landfill will be exposed and replaced, as needed. As part of this construction, U.S. Ceramic Tile will also identify the source of all piping outlets that are observed on the southern edge of the closed landfill.

Details of the proposed liner improvement activities will be included as part of the Interim Measures Work Plan that will be provided to U.S. EPA for review and approval within 90 days following the effective date of the Consent Decree. The work plan will describe the plans for investigation of the current cap and bottom liner system components (cap and bottom limits, drainage piping alignment and condition, unidentified drainage outlets, etc.) and also present the specifications for the cap extension and sealing to the bottom HDPE liners. The work plan will also include a contingency plan to address the procedures that will be implemented to minimize the potential for cap instability in response to the investigation activities (implement during the summer/fall dry season, limits on the length of exposed trench, etc.) and describing the response that will occur should any significant instability be experienced. The submittal will also include a construction quality assurance plan describing the specific field measurements (observation,

material conformance testing, non-destructive and destructive testing of HDPE liner seams, etc.) that will be implemented to demonstrate that the constructed improvements conform with the design (once approved).

Flood Protection Enhancement

In order to provide enhanced protection against possible future flooding in the low-lying area south of the landfill, U.S. Ceramic Tile will also construct a flood protection levee against the surface of the exposed slope south of the landfill. The levee will extend to an elevation of 945 feet, and will be constructed of relatively low permeability soils to meet the substantive requirements of the U.S. Army Corps of Engineers *Design and Construction of Levees* (EM 1110-2-1913). In order to prevent ponding behind the levee, areas adjacent to the landfill with ground surface elevations below 945 feet will also be backfilled to at least that level. The ground surface adjacent to the closed landfill will be graded to enhance surface water run-off away from the landfill, and the inlets associated with the western portion of the perimeter surface water drainage system will be raised to facilitate surface water drainage away from the landfill. These activities are depicted in Figure 5.

Details of the proposed flood protection dike will be presented in a engineering design report included as part of the Interim Measures Work Plan that will be provided to U.S. EPA for review and approval within 90 days following the effective date of the Consent Decree. The design submittal will include results of testing on the dike foundation soils, as well as the anticipated construction materials, and include foundation and slope stability calculations to demonstrate that the dike and landfill will remain stable under normal and flooding conditions. The submittal will also include a construction quality assurance plan describing the specific field measurements (observation, material conformance testing, compaction control testing, etc.) that will be implemented to demonstrate that the completed construction conforms with the design (once approved).

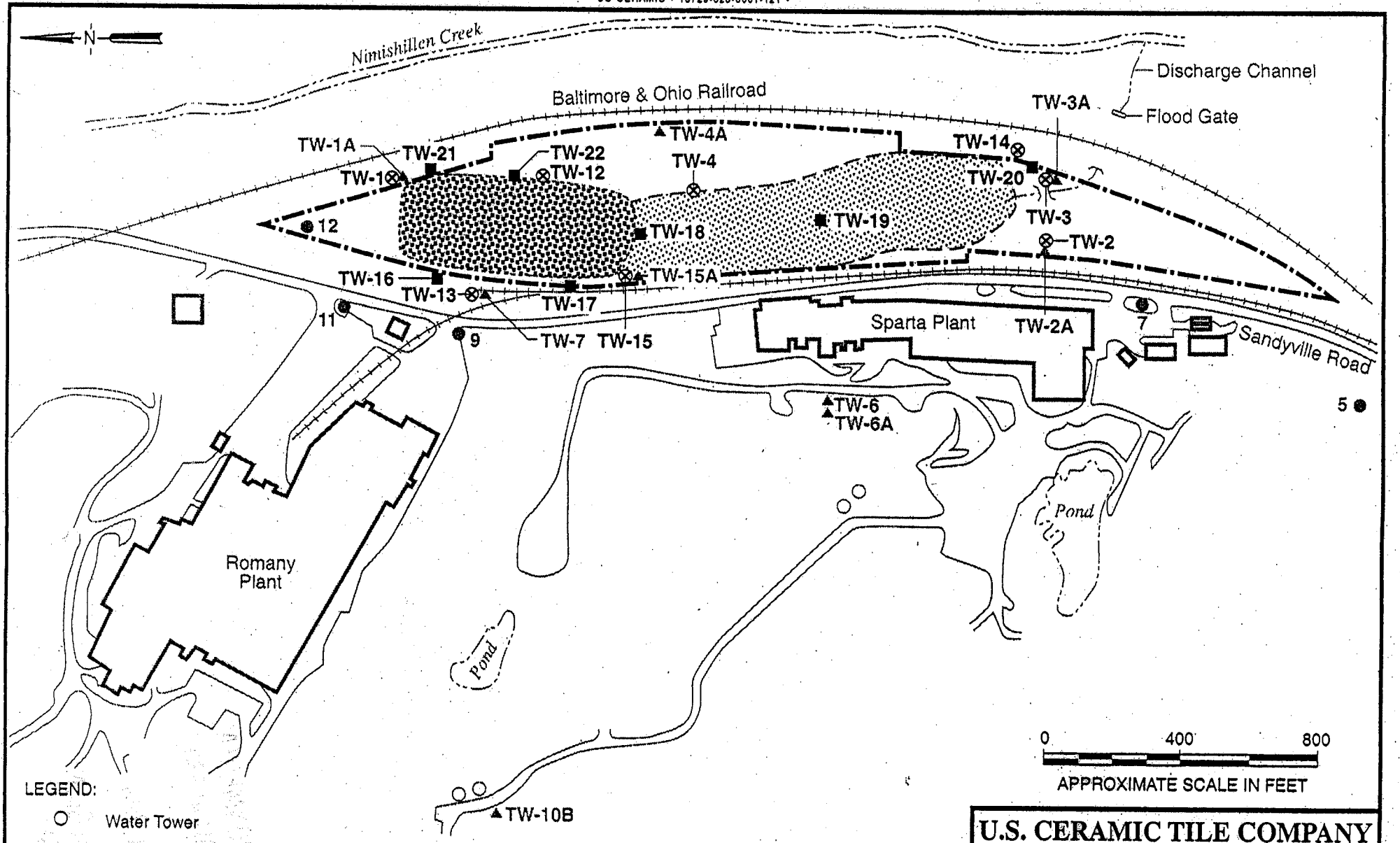
Quality Assurance During Landfill Enhancement Activities

All future construction activities will be performed under quality assurance oversight, including full-time observation of all construction activities by an independent quality assurance observer working under the direction and supervision of a professional engineer familiar with hazardous waste facility construction documentation requirements. Following completion of landfill enhancement construction activities, a construction

report (or series of reports) will be developed to describe the completed construction and assess compliance with the approved construction quality assurance plans. The report prepared following the last construction activity will also include an updated survey of the landfill depicting the final ground surface contours.

Operation and Maintenance Activities

Concurrent with and subsequent to the supplemental construction activities, U.S. Ceramic Tile will implement operation and maintenance activities associated with the landfill. These will include, but not be limited to, ground water monitoring, inspection and mowing of the final cap system, inspection and cleaning of the surface water drainage system, operation and monitoring of the leachate collection and detection systems, monitoring of settlement plates, recording and inspection during flood events, and inspection and maintenance of the flood protection dike. A more detailed description of the operation and maintenance activities will be provided in an Operation and Maintenance Plan that will be submitted to U.S. EPA, in conjunction with the Interim Measures Work Plan, within 90 days following the effective date of the Consent Decree. The Operation and Maintenance Plan will replace the existing post-closure care plan(s) for the landfill. The Operation and Maintenance Plan will also include a provision that requires U.S. Ceramic Tile to perform additional evaluation and corrective measures if needed, in the event that leachate production does not decrease significantly within one year following completion of the supplemental construction activities. The Operation and Maintenance Plan may be modified in the future in conjunction with the Facility-wide Corrective Measures Study and/or Corrective Measures Implementation, if needed.



LEGEND:

- Water Tower
- Former Hazardous Waste Management Area
- Landfill Area
- Proposed Surficial Sediment Aquifer Monitoring Well Approximate Location (Final Location to be Agreed Upon with Agencies Prior to Installation)
- Surficial Sediment Piezometric Monitoring Well Location (Not Suitable for Sampling)
- Bedrock Monitoring Well Location
- Industrial Water Production Well Location

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FIGURE 1
PROPOSED CHANGES TO SURFICIAL SEDIMENT AQUIFER MONITORING SYSTEM

JOB NO. 13729-023-121

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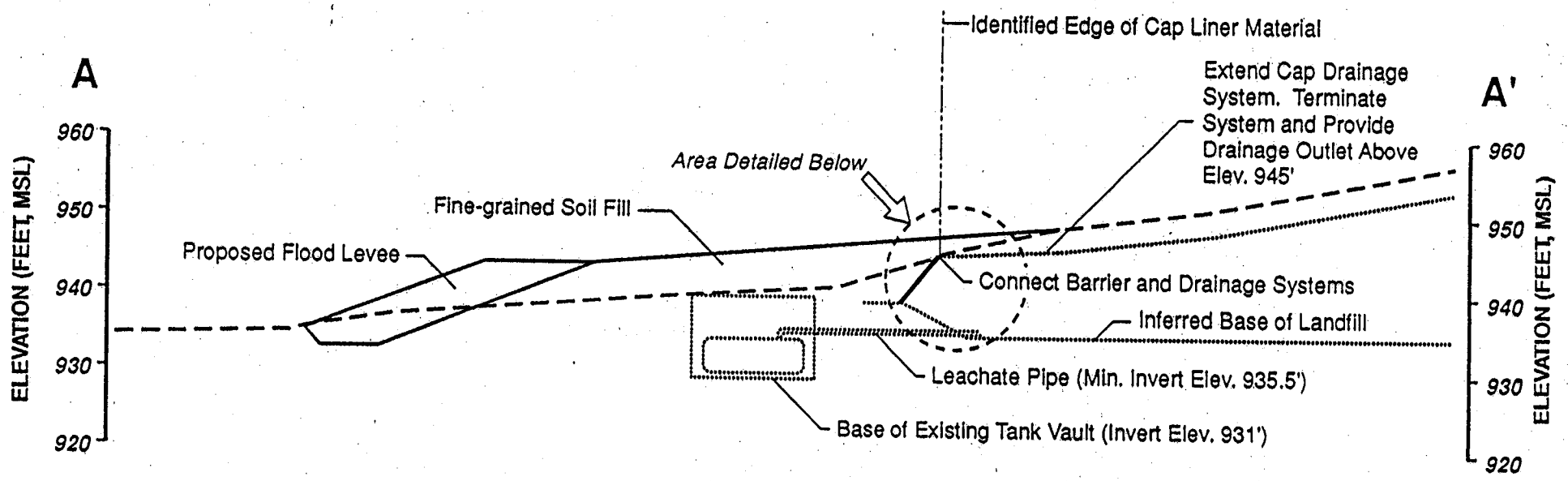
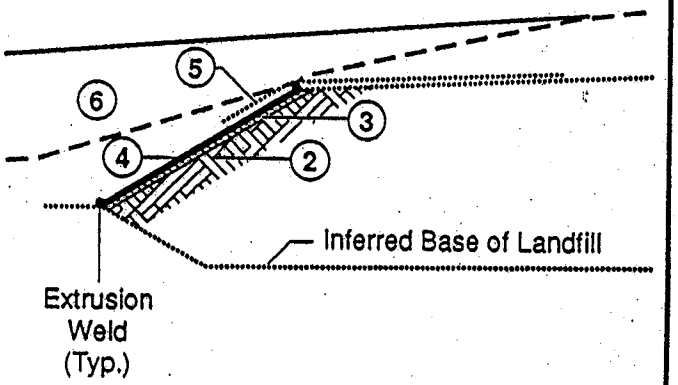


1. Identify Limits of Cap and Bottom HDPE Liner
2. Smooth and Prepare Subgrade for Synthetic Liner
3. Install Geosynthetic Clay Liner on Prepared Surface
4. Install HDPE Liner Between Cap and Bottom Limits - Extrusion Weld to Seal to Cap and Bottom Liners
5. Extend Cap Drainage System - Terminate System and Provide Outlet Above 945'
6. Install 30-Inch Thickness (Minimum) Protective Soil Cover. Blend to Surrounding Grade

DETAIL



LEGEND:

- Existing Ground Surface
- Existing Landfill Component
- Proposed Construction

0 20 40

APPROXIMATE SCALE IN FEET

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FIGURE 4
CROSS-SECTION A - A'

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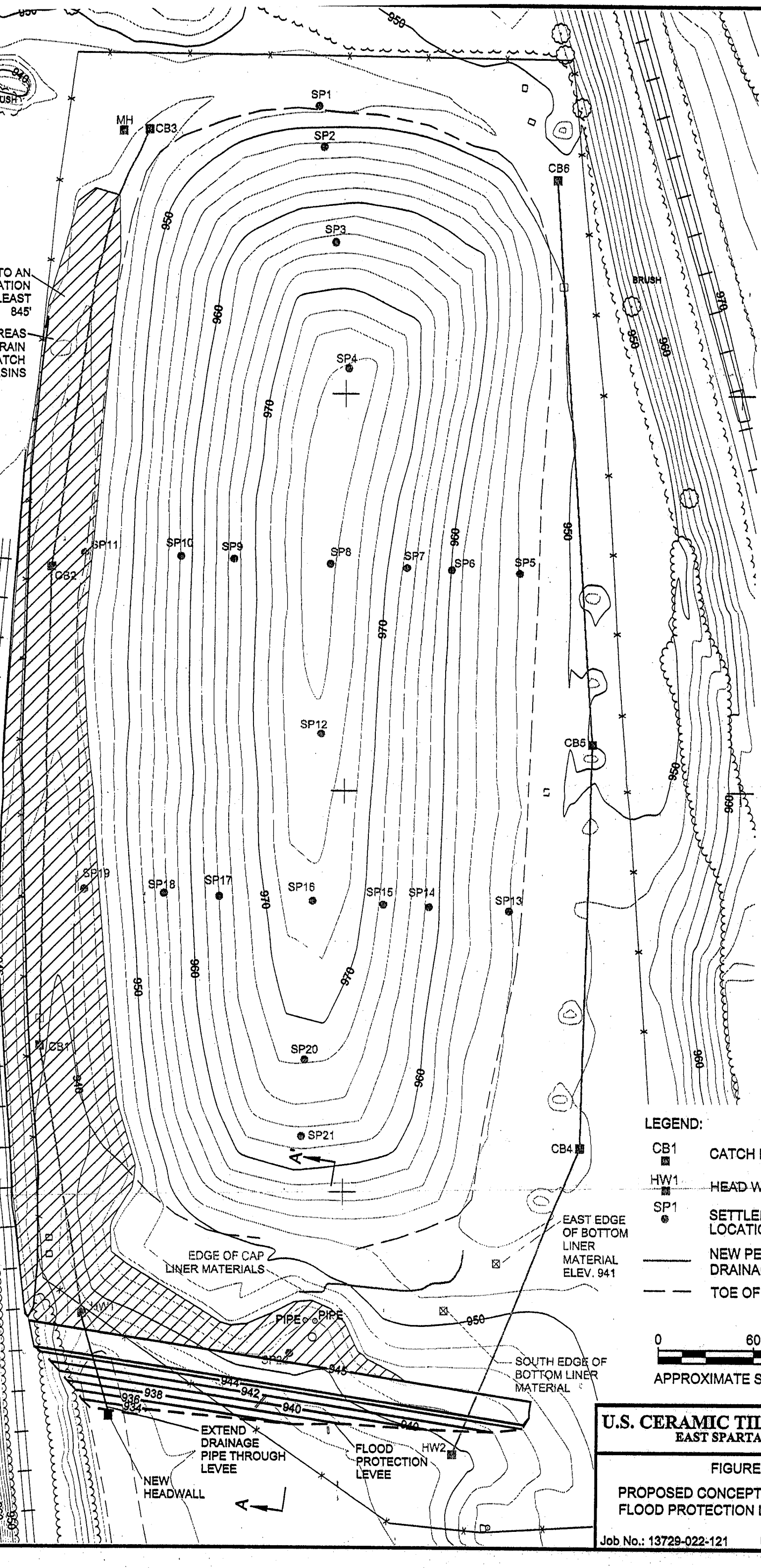

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FIGURE 5

PROPOSED CONCEPTUAL DE
FLOOD PROTECTION LEVEE /

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